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| **BIOLOGY TEST REVIEW: MITOSIS, DNA/RNA, PROTEIN SYNTHESIS & MUTATIONS** | | | | | |
| Label the diagram of the **Cell Cycle** below.  http://vanessa.jeffreyjason.com/wp-content/uploads/2011/06/cellcycle.jpg | | | **Use the Cell Cycle diagram to answer the following questions.**   1. **What is the longest phase of the Cell Cycle? What percentage of time is spent in this phase?** 2. **Interphase is divided into 3 phases. List & describe each phase.** | | |
| **Definition of Mitosis:**  **3 Reasons Mitosis is important…**               \*For each of the stages of Mitosis listed below, briefly explain what happens and draw a picture of a cell in that stage. | | | **Complete the table about Mitosis below.**   |  |  | | --- | --- | | **Parent Cell (n or 2n)** |  | | **# Daughter Cells Produced** |  | | **Daughter Cells (n or 2n)** |  | | **# of Cell Divisions** |  | | **Relationship between mother and daughter cells** |  | | **Relationship between daughter cells** |  | | **Where does it happen?** |  | | **# of Stages** |  | | | |
| **PROPHASE** | **METAPHASE** | | **ANAPHASE** | | **TELOPHASE** |
| **Vocabulary: Match the definition with the appropriate term***.*  \_\_\_\_\_ 1. division of the nucleus  \_\_\_\_\_ 2. region of the chromosome where sister chromatids are attached  \_\_\_\_\_ 3. division of the cytoplasm  \_\_\_\_\_ 4. phase of mitosis in which spindle fibers attach to the centromere of each pair of sister chromatids  \_\_\_\_\_ 5. coiled structures made of DNA and proteins  \_\_\_\_\_ 6. phase of mitosis in which sister chromatids separate and the centromeres divide  \_\_\_\_\_ 7. a segment of DNA with the genetic instructions to make a protein  \_\_\_\_\_ 8. two copies of replicated DNA that make a chromosome  \_\_\_\_\_ 9. the first and longest phase of mitosis  \_\_\_\_\_ 10. uncoiled DNA  \_\_\_\_\_ 11. a pair of the same chromosome  \_\_\_\_\_ 12. phase of mitosis in which the chromosomes begin to uncoil and form chromatin | | | | | |
| **Word Bank:** Anaphase(a), Centromere (b), Chromatid (c), Chromatin (d), Chromosome (e), Cytokinesis (f), Gene (g), Homologous Chromosome (h), Metaphase (i), Mitosis (j), Prophase (k), Telophase (l) | | | | | |
| What does **DNA** stand for? | | Where is DNA **located** in the cell? | | What does DNA **look** like? | |
| **Draw and label a DNA nucleotide.** | | | **In DNA…**   * **Adenine** pairs with… * **Cytosine** pairs with…   \*Nitrogenous bases are held together by… | | |
| **Match each scientist with their contribution to the discovery of DNA.**   |  |  | | --- | --- | | 1. \_\_\_\_\_ Franklin 2. \_\_\_\_\_ Griffith 3. \_\_\_\_\_ Hershey & Chase 4. \_\_\_\_\_ Watson & Crick 5. \_\_\_\_\_ Avery 6. \_\_\_\_\_ Chargaff | a. Concluded that DNA was the factor that caused one bacterium to transform into another  b. Used x-ray diffraction to determine DNA structure  c. Concluded that bacteria could be transformed from harmless to lethal from an unknown factor  d. Developed the double-helix structural model of DNA  e. Concluded that the genetic material of a bacteriophage is DNA  f. Showed that the percentages of nitrogenous bases in DNA are present in equal amounts |   **[http://01.edu-cdn.com/files/static/mcgrawhillprof/9780071626613/CELLS_04.GIF](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=L0aNUguPGLWwLM&tbnid=bnfAjDqrouY3tM:&ved=0CAUQjRw&url=http%3A%2F%2Fwww.education.com%2Freference%2Farticle%2Fcells%2F&ei=E2kHU7PtIuap2QX0voHAAw&bvm=bv.61725948,d.b2I&psig=AFQjCNEc0aEpQMbpyRRuZlJpbLxwIka6-Q&ust=1393080952092824)DNA Diagram:** Color the DNA diagram below using the following key. Phosphate (RED), Deoxyribose Sugar (BLUE), Adenine (GREEN), Cytosine (PURPLE), Guanine (ORANGE), Thymine (Yellow), Hydrogen Bonds (GRAY). Then, draw a circle around a nucleotide.  **DNA Replication:** Put the steps of DNA replication in order by writing a number (1-5) in the space before each statement.  \_\_\_\_\_ Two new molecules of DNA are created.  \_\_\_\_\_ DNA polymerase attach the free-floating nucleotides to the exposed nitrogen bases.  \_\_\_\_\_ Helicase begins to break the hydrogen bonds between nitrogen bases.  \_\_\_\_\_ Cell starts into the mitosis phase of the cell cycle.  \_\_\_\_\_ Free floating nucleotides pair up with exposed nitrogen bases.   |  |  |  | | --- | --- | --- | | **Why** does DNA replicate? | **When** does DNA replicate? | **Where** does DNA replicate? | | | | | | |
| What does **RNA** stand for? | | What are the **3 types** of RNA? | | Where does **Protein Synthesis** occur? | |
| **Compare and Contrast…**  **TRANSCRIPTION:**  **TRANSLATION:** | | | **Compare and Contrast…**  **CODON:**  **ANTICODON:** | | |
| **Sequence:** Put the following steps of Protein Synthesis in order by numbering 1 through 5.  \_\_\_\_\_\_\_\_ mRNA leaves the nucleus with the DNA code, and goes to the ribosomes  \_\_\_\_\_\_\_\_ribosomes make proteins  \_\_\_\_\_\_\_\_mRNA and tRNA meet in the ribosomes  \_\_\_\_\_\_\_\_DNA temporarily unzips  \_\_\_\_\_\_\_\_mRNA nucleotides match up to DNA | | | Label the following diagram with these terms: **DNA**, **mRNA, tRNA, ribosome, nucleus, codon, anticodon, and protein.** | | |
| The code on a DNA strand reads:  **G C G T A A T G A**   1. The **mRNA** strand would read: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. Use the **mRNA** to now make **tRNA**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3. How many amino acids have been coded for by the above DNA strand? \_\_\_\_\_\_\_ 4. **What** are proteins composed of? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 5. **Where** are proteins made? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 6. What is the role of tRNA? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 7. What is the role of mRNA? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8. How many different types of amino acids are there? \_\_\_\_\_\_\_ 9. What molecule found in the nucleus carries (has) the code for making a protein? \_\_\_\_\_\_\_ 10. When the information from DNA is passed to RNA this process is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. 11. Give the **DNA** segment for the following strand of **mRNA**. A U G G C A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 12. Give the **mRNA** segment for the following strand of **tRNA**. C U U A A G \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 13. Where does **transcription** occur? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 14. What is a **similarity** of DNA and RNA? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 15. What base is unique to **DNA**? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 16. What base is unique to **RNA**? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 17. What **molecule** is RNA transcribed from? \_\_\_\_\_\_\_\_\_ 18. How many bases make up a **codon**? \_\_\_\_\_\_\_ | | | | | |
| **Complete the diagram below using your knowledge of Transcription and Translation.**    **codon chart** | | | | | |
| **Using a Codon Chart.**   1. Name the amino acids that are coded by the following codons: 2. AAA= e. CAC= 3. UAC= f. UGA= 4. GGG= g. AGC= 5. GGA= h. CCC= 6. Write the amino acid sequence to make up the protein: GCA – GGU – CCA – AUG – UGC 7. Write the amino acid sequence to make up the protein: GCA – GGU – CCG – AUA – UGC | | | | | |
| **Define MUTATION:**   |  |  | | --- | --- | | **Deletion** | 1. **A piece of one chromosomes breaks off & attaches to a neighboring chromosome** | | **Duplication** | 1. **A nitrogenous base is added/inserted to a DNA sequence** | | **Inversion** | 1. **A sequence of genes become oriented in the reverse direction** | | **Translocation** | 1. **A nitrogenous base or gene is lost/deleted** | | **Substitution** | 1. **Extra copies of a gene(s) are added to a chromosome** | | **Insertion** | 1. **A nitrogenous base is substituted for another nitrogenous base** | | | | | | |